

Candidate Marks Report

Series : 6 2026

This candidate's script has been assessed using On-Screen Marking. The marks are therefore not shown on the script itself, but are summarised in the table below.

Centre No :	PK470	Assessment Code :	5090
Candidate No :	58	Component Code :	42
Candidate Name :	HUZAIFA UMER,		

In the table below 'Total Mark' records the mark scored by this candidate.
'Max Mark' records the Maximum Mark available for the question.

Paper:	5090/42	
Paper	34 / 40	
Total:		
Question	Total / Max Mark Mark	
1ai	2 / 2	
1aii	1 / 1	
1aiii	2 / 2	
1bi	0 / 1	
1bii	1 / 1	
1ci	4 / 4	
1cii	2 / 2	
1ciii	0 / 2	
1civ	1 / 2	
1cv	1 / 1	
1di	6 / 6	
1dii	1 / 1	
2ai	1 / 1	
2aii	5 / 5	
2bi	0 / 1	
2bii	2 / 2	
2biii	3 / 3	
2c	2 / 3	



Cambridge O Level

 CANDIDATE
NAME

Huzairfa Umer

 CENTRE
NUMBER

P K 4 7 0

 CANDIDATE
NUMBER

0 0 5 8

BIOLOGY

5090/42

Paper 4 Alternative to Practical

May/June 2026

1 hour

You must answer on the question paper.

No additional materials are needed.

Casio fx-991ES PLUS

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen. Do **not** use correction fluid or tape.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 40.
- The number of marks for each question or part question is shown in brackets [].

09 05

This document has 12 pages. Any blank pages are indicated.



- 1 A student investigated the vitamin C content of a fruit juice, X, using DCPIP.

DCPIP is a dark blue solution that becomes completely colourless when vitamin C is added to it.

When the percentage concentration of a vitamin C solution is high, fewer drops of that solution are needed to completely decolourise the DCPIP.

The student was provided with:

- ✓ dark blue DCPIP solution
- ✓ four different vitamin C solutions of known percentage concentrations
- ✓ fruit juice X with an unknown vitamin C concentration
- ✓ a spotting tile
- ✓ six test pipettes.

- (a) They followed these instructions.

- ✓ Add 2 drops of DCPIP to each of 5 of the wells on the spotting tile.
- ✓ Add drops of 0.25% vitamin C solution to the DCPIP in the first well until the DCPIP turns completely colourless. Count the drops as you add them and record this number.
 - Add drops of 0.50% vitamin C solution to the DCPIP in the second well until the DCPIP turns completely colourless. Count the drops as you add them and record this number.
 - Add drops of 0.75% vitamin C solution to the DCPIP in the third well until the DCPIP turns completely colourless. Count the drops as you add them and record this number.
 - Add drops of 1.00% vitamin C solution to the DCPIP in the fourth well until the DCPIP turns completely colourless. Count the drops as you add them and record this number.

Some of the student's results are shown in Table 1.1.

Table 1.1

Percentage concentration of vitamin C solution. ✓	Number of drops needed to decolourise DCPIP ✓
1.00	5
0.75	13 ✓
0.50	19
0.25	24

- (i) Insert the headings for each column in Table 1.1.

[2]

- (ii) Figure 1.1 shows the tally counts of the number of drops of 0.75% and 0.50% concentration of vitamin C solutions needed to turn DCPIP completely colourless.

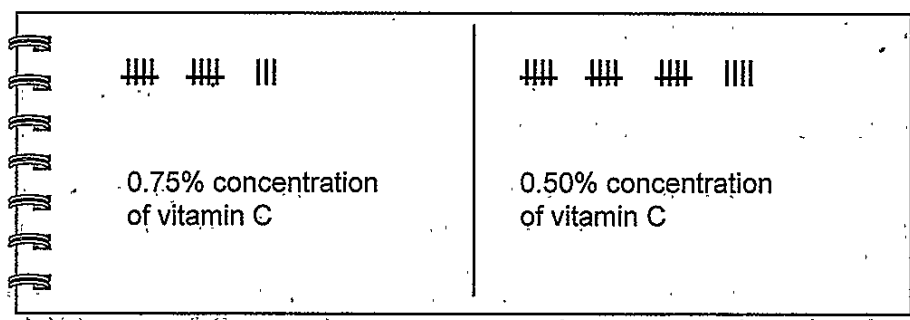


Figure 1.1

Use the student's results in Figure 1.1 to complete Table 1.1.

[1]

- (iii) The student used a clean teat pipette to add drops of fruit juice X to the DCPIP in the fifth well until the DCPIP turned completely colourless.

The number of drops of fruit juice X needed to turn the DCPIP completely colourless was 22.

Use the results in Table 1.1 to estimate the percentage concentration of vitamin C in fruit juice X and explain how you made your estimate.

percentage concentration of vitamin C in fruit juice X 0.35% ✓

explanation As ⁽²²⁾ number of drops needed to decolourise DCPIP lies between the number of 0.50 and 0.25 concentration. Hence it would be between 0.50 to 0.25. ✓ [2]

- (b) (i) Describe one possible source of error in this investigation.

Counting number of ^{drops} ~~bubbles~~, as sometimes unconsciously two drops leave the dropper. [1]

- (ii) Suggest a suitable control for this investigation.

Add water in DCPIP instead of vitamin C solution. ✓ [1]



- (c) Some students want to find the percentage concentration of vitamin C in a different fruit juice, Y, using DCPIP and a different method of measuring.

Using a clean syringe, 0.5 cm^3 of DCPIP is added to each of 5 test-tubes.

1.0% concentration of vitamin C solution is added to one test-tube until the DCPIP turns completely colourless. The volume of 1.0% vitamin C solution added is recorded.

0.8% concentration of vitamin C solution is added to the second test-tube until the DCPIP turns completely colourless. The volume of 0.8% vitamin C solution added is recorded.

- ✓ The process is repeated using the final 3 test-tubes with 0.6%, 0.4% and 0.2% concentrations of vitamin C solutions.

The students repeat the whole procedure several times and calculate the mean result for each percentage concentration as shown in Table 1.2

Table 1.2

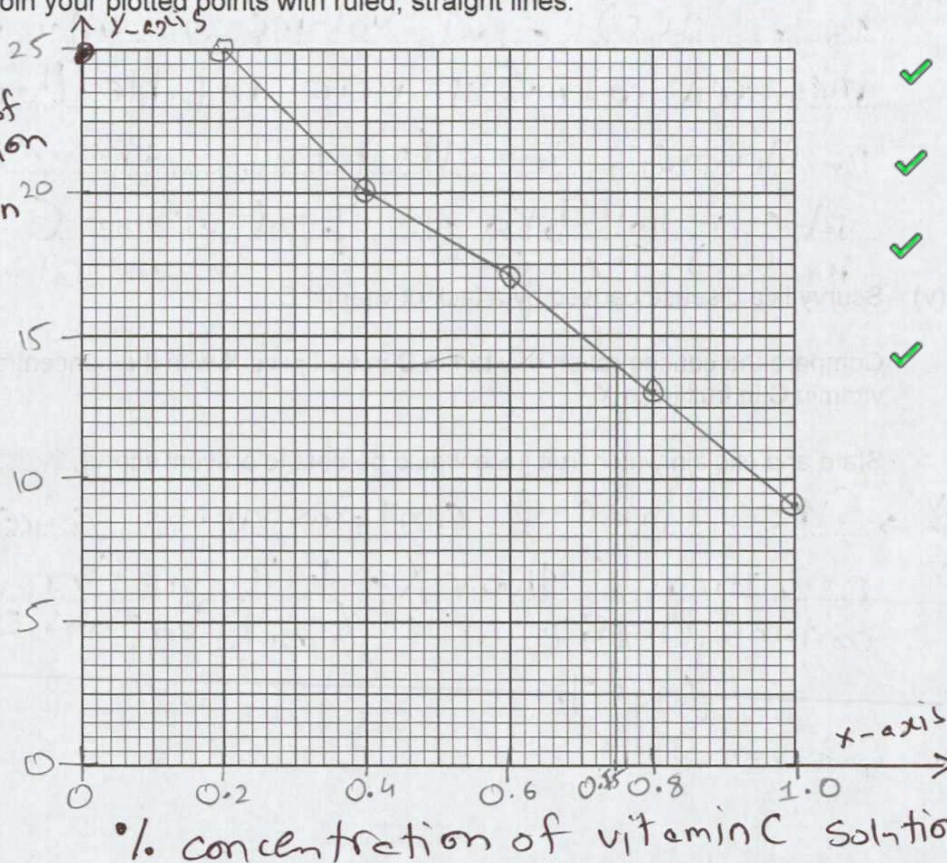
percentage concentration of vitamin C solution	mean volume of vitamin C solution needed to turn DCPIP completely colourless / cm^3
1.0	9
0.8	13
0.6	17
0.4	20
0.2	25



- (i) On the grid, construct a line graph of the data in Table 1.2.

Join your plotted points with ruled, straight lines.

Mean volume of
vitamin C solution
needed to turn
DCPIP
completely
colourless/cm³



- (ii) The students then add fruit juice Y to 0.5 cm³ of DCPIP in a test-tube until the DCPIP turns completely colourless. They repeat this several times. The mean volume of fruit juice Y needed to turn 0.5 cm³ of DCPIP completely colourless was 14 cm³.

Use your graph to estimate the vitamin C concentration in fruit juice Y.

Show your working on your graph.

percentage concentration of vitamin C in fruit juice Y 0.75 [2]

- (iii) Suggest how the students can improve this whole investigation to produce a more precise value for the concentration of vitamin C in fruit juice Y.

(He should pour the vitamin C concentration)
by using a burette. He should repeat
the experiment three times and then
calculate the mean value ^{volume} needed of [2]
and estimate it using graph.



- (iv) Suggest **two** reasons why the method in 1(c) gives more accurate results than the method in 1(a).

1. In 1(c) exact volume of vitamin C is measured making it more reliable than 1(a).
 2. Moreover, in 1(a) only an estimate value is calculated of % of vitamin C in X. while in 1(c) the exact value is to be calculated. [2]

- (v) Scurvy is a disease caused by a lack of vitamin C.

Compare the concentration of vitamin C in fruit juice X with the concentration of vitamin C in fruit juice Y.

State and explain which fruit juice would be best to prevent scurvy.

Juice Y, Since juice Y contains more concentration of vitamin C than X. It is preferred as Y contains ~~0.75%~~ 0.75% while X only contains 0.35% of vitamin C. [1]

- (d) (i) Lemon juice contains vitamin C. The vitamin C in lemon juice is destroyed at high temperatures.

A student has some lemon juice that is 20°C . They find that the minimum volume of lemon juice at 20°C that is required to turn DCPIP completely colourless is 10 cm^3 .

The student heats the lemon juice to a high temperature and allows it to cool. When more than 10 cm^3 of this lemon juice is added to DCPIP, the DCPIP remains blue. This shows that the vitamin C in the lemon juice has been destroyed at a high temperature.

Plan an investigation using the method in 1(c) to find the lowest temperature at which vitamin C in lemon juice is destroyed.

Pour 10 cm^3 of ~~fixed concentration of vitamin~~ ✓ 6
 Lemon juice in a test tube by the help of
 a clean syringe. Place it in a thermostatically
 controlled water bath whose temperature is 20°C .
 Place a thermometer in test tube and when the
 reading shows 20°C . Take it out and left it
 to cool. When it cools add it in 0.5 cm^3 of DCPIP ✓ 4
 and wait for its colour to change. Now repeat the
 same experiment using ~~(30° , 40° and 50°C)~~ ✓ 3
 Throughout the experiment volume of lemon juice
 and volume of DCPIP used must remain same. When
 10 cm^3 of lemon juice is added in DCPIP and its
 colour doesn't change it means that vitamin C in lemon juice is destroyed. [6]
 (ii) State the independent variable in this investigation. ★ 2

Temperature ✓

[1]

[Total: 25]

★ 1 (25° , 30° , 35° , 40° , 45°C) ✓ 1

★ 2 Repeat the experiment with the same temperature
 thrice ✓ 7 to finally conclude that it is the actual
 temperature at which vitamin C is destroyed. ✓ 9
 And no further colour change of DCPIP takes
 place. In experiment concentration of DCPIP
 should also be fixed. used.

2 (a) Figure 2.1 is a photomicrograph of onion cells.

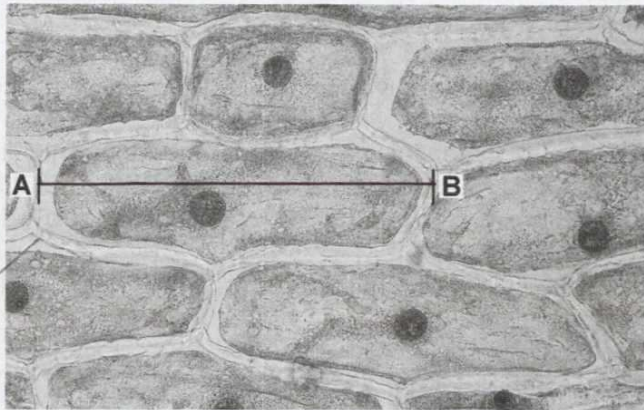
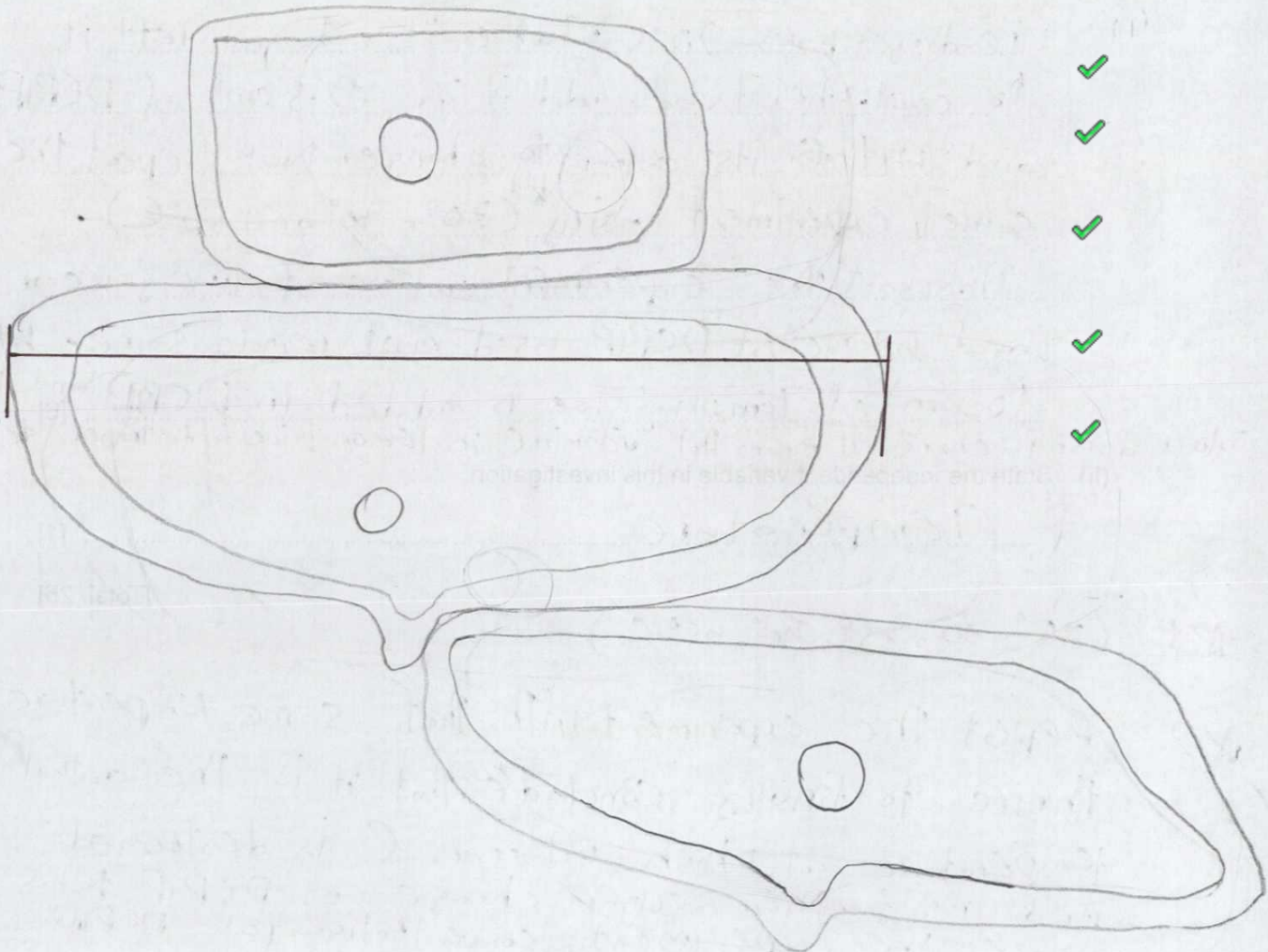


Figure 2.1

(i) On Figure 2.1, draw a line to a cell wall and label it **W**. ✓

[1]

(ii) In the space, make a large drawing of the three whole cells as they appear in Figure 2.1.



[5]

(b) (i) On Figure 2.1, draw a straight line to join A and B.

On your drawing, draw a straight line in the same position and label it A-B. ^ [1]

(ii) Measure and record the lengths of these two lines.

length of line A-B on Figure 2.1 55 mm ✓ ✓

length of line A-B on your drawing 131 mm [2]

(iii) Calculate the magnification of your drawing compared to Figure 2.1.

Record your answer to **one** decimal place.

Space for working.

$$M = \frac{I}{A}$$

$$M = \frac{131}{55}$$

magnification × 2.4 ✓ ✓ ✓ [3]

$$M = 2.38 \approx 2.4$$

(c) Figure 2.2 is a photomicrograph of some cheek cells.

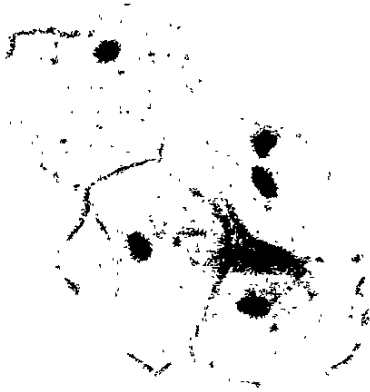


Figure 2.2

Describe **two** visible differences and **one** similarity between the onion cells in Figure 2.1 and the cheek cells in Figure 2.2. The figures are not to the same scale.

difference 1 ~~2~~ Large vacuole in onion cells
while no vacuole can be seen in cheek cells.

difference 2 Onion cells are rectangular shaped
while ~~are~~ cheek cells are circular or irregularly shaped.

similarity Both contain nucleus showing a
dark spot.
↓
circular

[3]

[Total: 15]



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